

## HUB LEG JOINT SYSTEM FOR A SHELTER

### TECHNICAL FIELD OF THE INVENTION

(0001) The present invention is directed to shelters, and more specifically to a shelter having a pole frame.

### BACKGROUND OF THE INVENTION

(0002) Camping is a popular recreational activity enjoyed by many. Some people camp so that they may enjoy the outdoors, and others use camping as an inexpensive alternative to staying in a hotel.

(0003) One structure that is often used while camping is a shelter. In general, a shelter is a structure, typically framed with poles, that includes a covering or canopy that provides protection from the rain and/or sun. For camping, a shelter is typically made of fabric and foldable poles so that the shelter may be folded into a compact configuration for transport and storage. The shelter may or may not have walls, such as screen walls. The shelter may be, for example, set up over a picnic area, used adjacent to a tent as a storage area, serve as protection from the rain, or may be used as a screened area to avoid insects.

(0004) Although shelters work well for their intended purpose, in practice, the shelters may not be stable enough to handle higher winds. Some prior art shelters have addressed this problem by providing additional poles in the frame, such as poles that extend horizontally between the support poles for the shelter. Such additional poles add to the weight and size of the stored shelter, and add installation complexity and time. However, a shelter that has a minimal number of poles is subject to stability problems, mainly because the connection of the poles has been known to twist, resulting in a collapse of the shelter.

### SUMMARY OF THE INVENTION

(0005) The following presents a simplified summary of some embodiments of the invention in order to provide a basic understanding of the invention. This summary is not an extensive overview of the invention. It is not intended to identify key/critical elements of the invention or to delineate the scope of the invention. Its sole purpose is to present some embodiments of the invention in a simplified form as a prelude to the more detailed description that is presented later.

(0006) In accordance with an embodiment of the invention, a hub leg joint system is provided in which twisting of poles for a shelter is prevented. The hub leg joint system includes a hub having a socket or opening for receiving an end of a support pole for a shelter. The opening and the end are configured so that the end may be inserted into the opening, but may not be rotated therein. As an example, the opening and the ends may have a cross section that is oblong in shape.

(0007) The connection of the pole to the hub prevents rotation of the pole relative to the hub. Such a connection may be provided for each of the pole attachments to the hub. Thus, stability is provided for the shelter.

(0008) Other features of the invention will become apparent from the following detailed description when taken in conjunction with the drawings, in which:

### **BRIEF DESCRIPTION OF THE DRAWINGS**

(0009) FIG. 1 is a side perspective view of a shelter incorporating an embodiment of the invention, with a fabric canopy for the shelter shown in phantom;

(0010) FIG. 2 is an exploded side perspective view of a hub leg joint system in accordance with an embodiment of the invention;

(0011) FIG. 3 is a sectional view taken along the section lines 3--3 of FIG. 2; and

(0012) FIG. 4 is a side perspective view of a second shelter incorporating a second embodiment of the present invention.

### **DETAILED DESCRIPTION**

(0013) In the following description, various embodiments of the present invention will be described. For purposes of explanation, specific configurations and details are set forth in order to provide a thorough understanding of the embodiments. However, it will also be apparent to one skilled in the art that the present invention may be practiced without the specific details. Furthermore, well-known features may be omitted or simplified in order not to obscure the embodiment being described.

(0014) Referring now to the drawings, in which like reference numerals represent like parts throughout the several views, FIG. 1 shows a shelter 20 incorporating an embodiment of the invention. The shelter 20 includes a pole assembly 22 over which is extended a fabric canopy 24. The fabric canopy 24 is shown in phantom in the drawings so as not to obscure the pole assembly 22. The fabric canopy 24 may be made of a variety of different materials, including rip stop nylon, canvas, polyethylene, or other suitable materials. In addition, while the embodiment shown in the drawings does not include walls, walls may be provided on one or some of the sides of the shelter 20. The walls may be made of the same fabric material as the fabric canopy 24, or may be made of a

different material, such as screen. Walls for shelters are well known in the art, and a person of ordinary skill may select a suitable fabric and design for a desired configuration and use of the shelter 20.

(0015) The pole assembly 22 shown in FIG. 1 includes four upright poles 26, 28, 30, and 32. The upright poles 26-32 may be formed of segments of metallic poles, such as steel, aluminum, or another suitable material. Such poles 26-32 may be attached end-to-end to form a complete upright pole in a manner known in the art. The four poles 26-32 for the pole assembly 22 are identical in shape, and therefore are interchangeable. However, embodiments of the invention could utilize different sizes and shapes of upright poles. However, the structure shown provides an embodiment with the upright poles 26-32 being interchangeable, thus requiring less thought in preparation for assembly.

(0016) Each of the upright poles 26-32 includes a bend 33 approximately half way along its length. In this manner, each of the upright poles 26-32, when installed, has a lower portion 34 that extends substantially vertically, and an upper portion 35 that extends at an angle to vertical, in the embodiment shown at approximately 60 degrees to vertical. The lower portion 34 is separated from the upper portion 35 at the

bend 33.

(0017) Curved upright poles such as are shown in FIG. 1 are known in the art, and provide the benefit of expanding shelter space without making a shelter taller. That is, if the poles did not include a bend such as the bend 33, to have the same amount of area covered by the shelter, the shelter must be taller.

(0018) Although each of the upright poles 26, 28, 30, and 32 is shown as a continuous pole that extends from the top portion of the shelter 20 to the ground, as described above, the poles could be made from a plurality of pole sections. These pole sections may be connected by an internal shock cord in a manner known in the art. In addition, one or more intermediate structures may be provided between different sections of an upright pole, for example between the upper and lower portions 34, 35.

(0019) The rear two upright poles 26, 28 extend to a rear hub 36, and the front two upright poles 30, 32 extend to a front hub 37. The hubs 36, 37 preferably are made of plastic or another suitable material. In the embodiment shown, the hubs 36, 37 are identical in construction, and are therefore interchangeable, providing ease shelter construction and manufacture. However, the hubs 36, 37 may be configured



in a different way by a person of skill in the art so as to provide a shelter of a desired configuration and size.

(0020) A ridge pole 38 extends between the two hubs 36, 37. The ridge pole 38 provides two functions. First, the ridge pole 38 supports an upper portion of the fabric canopy 24. Second, the ridge pole separates the two hubs 36, 37 so that the shelter 20 may cover more ground without having to raise the height of the shelter 20 or decrease the angle of the fabric canopy 24, which could result in undesirable pooling of water at the edges of the fabric canopy 24.

(0021) Detail of the hub 36 is shown in FIG. 2. As stated above, this hub 36 is identical to the hub 37. Thus, for ease of description, the structure of only one of the hubs, hub 36, is described here.

(0022) The hub 36 is triangularly shaped, with openings 40, 42, 44 at each of the corners. The openings 40-44 are elongate holes that extend toward the center of the hub 36. The opening 44 includes a round cross section, while the openings 40, 42 are oblong, and have a cross section having flat sides 43 (FIG. 3) and rounded tops and bottoms 45.

(0023) Each of the openings 40-44 includes a slot 46 extending through the top of the hub 36 and into the opening. The openings 40, 42 are configured to receive ends 48, 50 of

the upright poles 26, 28. These ends 48, 50 are slightly narrower in cross section than the remainder of the poles 26, 28, are oblong in shape, and include flat sides 49 and rounded tops and bottoms 51, as can be seen in FIGS. 2 and 3. The ends 48, 50 are preferably sized so that the flat sides 49 and rounded tops and bottoms 51 fit tightly against the inside of the flat sides 43 (FIG. 3) and rounded tops and bottoms 45 of the openings 40, 42.

(0024) A clip 52, 54 is arranged inside each of the ends 48, 50 of the uprights poles 26, 28. A portion of each clip 52, 54 extends out of a slot 55 from the top portion of the respective upright pole 26 or 28. As is known in the art, the clip 52, 54 is designed to press inward as the respective end 48, 50 of the poles 26, 28 is extended into the opening 40 or 42. The clip 52, 54 then pops upward and out of the respective slot 46 for the opening 40 or 42. A similar clip (not shown) may be provided at the ends of the ridge pole 38.

(0025) The flat sides 49 and rounded tops and bottoms 51 of the ends 48, 50 fit tightly against the inside of the flat sides 43 and rounded tops and bottoms 45 of the openings 40, 42, preventing rotation of the upper portion 35 of the upright poles 26, 28 within the hub 36. This feature provides advanced stability for the shelter 20, because prevention of

rotation of the upper portion 35 of the upright poles 26, 28 prevents the lower portion 34 from moving in the directions of the arrows K and M shown in FIG. 1. Reducing this twisting effect increases the stability of the shelter 20, making the shelter more stable in strong wind conditions.

(0026) Although the configuration of the ends 48, 50 and the openings 40, 42 works well to prevent twisting, other configurations may be used. In general, any configuration that permits the upright poles 26, 28 to be attached to the hubs without the poles rotating relative to the hubs work perform this function. One example is the oblong shape for the openings 40, 42 and ends 48, 50. Another example includes at least one protrusion and a corresponding abutment surface in the respective opening. However, the particular configuration shown in the drawings is convenient in that the structure enjoys the benefit of the strength of tubular poles, yet has a configuration which prevents twisting.

(0027) In the embodiment shown in FIGS. 1-3, the opening 44 for receiving the ridge pole 38 does not have an irregular cross section like the openings 40, 42. This is because twisting at the ridge pole 38 does not affect the stability of the shelter 20. However, if desired, the ridge pole opening 44 may also include an end and opening that are

configured to prevent rotation of the ridge pole 38.

(0028) To aid in alignment and assembly of the upright poles 26, 28 to the hub 36, indicia, such as the letters "A" and "B" shown in FIG. 2 may be provided near the edge of the respective opening 40 or 42, and the end 48 or 50 of the respective upright poles 26, 28. In this manner, a user may quickly assemble the upright poles 26, 28 with the lower portion 34 of the upright poles 26, 28 being directed in the proper, downward position, without a user attempting to attach either of the upright poles 26, 28 to the opening 44.

(0029) Although each of the upright poles 26, 28, 30, and 32 is shown as a continuous pole that extends from the top portion of the shelter 20 to the ground, as described above, the poles could be made from a plurality of pole sections. These pole sections may be connected by an internal shock cord in a manner known in the art. In addition, one or more intermediate structures may be provided between different sections of an upright pole, for example between the upper and lower portions 35, 34. However, to avoid rotation of the lower portion 34 of an upright poles 26-32, there should be no rotation between the attachment of the respective upright pole to the hub 36 and a position on the pole just below the bend 33 for the upright pole. Thus, if segments are provided

between this location and the hub 36, these segments should be configured so that, when installed, they do not rotate relative to one another.

(0030) Another embodiment of a shelter 56 is shown in FIG. 4. The shelter 56 includes a pole assembly 58 having four upright poles 60, 62, 64, 66 covered at a top portion by a fabric canopy 68. This shelter 56 is similar to the shelter 20, but does not include a ridge pole 38 and has only one hub 70. In addition, the hub 70 has four spokes for attachment of the four upright poles 60-66.

(0031) Because each of the openings in the hub 70 attach to an upright pole 60-66, preferably each of the each of the upright poles will attach to respective openings for the hub 70 without permitting rotation. For example, each opening may including an oblong cross section similar to the one shown for the openings 40 and 42 in FIGS. 2 and 3. As such, each connection of the upright poles 60-66 to the hub 70 is formed so that the respective upright pole 60-66 does not rotate relative to the hub 70.

(0032) Other embodiments of shelters are also contemplated. For example, a five-sided shelter may include a five-spoke hub attached to five upright poles.

(0033) The removable, non-rotating attachment of the

upright poles to the hub is convenient in that it avoids rotation of the upright poles relative to the hub and adds stability to a shelter. The configuration disclosed in the drawings does so with little added cost and little to no reduction in strength of the upright poles.

(0034) The upright poles disclosed in the drawings are advantageous in that they provide the sole support for the fabric canopy 24. Thus, the shelter may be made lighter, and is easy to assembly and store. The fact that the upper portion 35 and the bend 33 cannot rotate provides a downwardly extending structural support for the lower portions of the upright poles that cannot rotate. As such, additional support for the downwardly extending structural support, such as poles or other structures, is not needed.

(0035) If desired, different attachments may be made between the hubs and the upright poles. For example, the hubs may include a protrusion over which an end of an upright pole is seated. To this end, the hub may be any structure that is used to attach the upper portion 35 of two upright poles.

(0036) In accordance with another embodiment of the invention, if desired, in order to avoid rotation of one of the upright poles (e.g., the upright poles 60-66) relative to a hub (e.g., the hub 70), that particular upright pole may be

formed integrally with, or permanently connected to, the hub 70. The other upright poles and ridge pole 38 (if applicable), however, are preferably removable, so that the pole assembly 22 or 58 may be disassembled into a compact configuration for storage.

(0037) Other variations are within the spirit of the present invention. Thus, while the invention is susceptible to various modifications and alternative constructions, a certain illustrated embodiment thereof is shown in the drawings and has been described above in detail. It should be understood, however, that there is no intention to limit the invention to the specific form or forms disclosed, but on the contrary, the intention is to cover all modifications, alternative constructions, and equivalents falling within the spirit and scope of the invention, as defined in the appended claims.

(0038) The use of the terms "a" and "an" and "the" and similar referents in the context of describing the invention (especially in the context of the following claims) are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. The terms "comprising," "having," "including," and "containing" are to be construed as open-ended terms (i.e.,

meaning "including, but not limited to,") unless otherwise noted. The term "connected" is to be construed as partly or wholly contained within, attached to, or joined together, even if there is something intervening. Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., "such as") provided herein, is intended merely to better illuminate embodiments of the invention and does not pose a limitation on the scope of the invention unless otherwise claimed. No language in the specification should be construed as indicating any non-claimed element as essential to the practice of the invention.

(0039) Preferred embodiments of this invention are described herein, including the best mode known to the inventors for carrying out the invention. Variations of those preferred embodiments may become apparent to those of ordinary skill in the art upon reading the foregoing description. The



inventors expect skilled artisans to employ such variations as appropriate, and the inventors intend for the invention to be practiced otherwise than as specifically described herein. Accordingly, this invention includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described elements in all possible variations thereof is encompassed by the invention unless otherwise indicated herein or otherwise clearly contradicted by context.